2013 Curriculum Grant Awardee

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College: College of Engineering
Department: Civil Engineering

Project Description:

This two-year university-level project proposes to improve the student-centered undergraduate research experience in several programs across multiple colleges, specifically, Civil Engineering and Geomatics Engineering (College of Engineering and Computer Science) and Geology and Geography (Charles E. Schmidt College of Science). The proposal involves both revision of existing courses/programs (5) and also new courses (2). The focus will be on active learning pedagogies and assessments to specifically address SLO 2,3,4 and 6 in a comprehensive and targeted manner. Two main goals are proposed: 1) create a new culture based on undergraduate research and inquiry at the skill building level in several undergraduate degree program's upper divisions (including Geomatics Engineering, Civil Engineering, Geology, and Geography), and (2) create a new exposure level course at the junior level that is all about how to conduct undergraduate research (EGN3910-Research 1) and create its companion course (EGN4911- Research 2) which will be an industry-mentored or peer-mentored undergraduate research project at the intensive level. All of these courses fit within the mission of the University's commitment to increasing opportunities for undergraduate research as well as the individual programs' missions. The participants for this proposal include 8 faculty members across 4 academic programs. For goal 1, we plan to revise and/or enhance substantively a number of upper division courses by creating scaffolded student-centered research experiences to better support student learning outcomes and the capstone courses in the respective programs. In each program, a key upper division course will be targeted for implementation, as follows: Civil Engineering 4000-level design courses (CES4702-Reinforced Concrete Design), Geomatics Engineering eLearning 3000-level lecture/lab courses (SUR3331 Photogrammetry + lab), Geology 4000-level core course (GLY4822 Hydrogeology), Geography 4000-level environmental systems elective (GEO4300 Biogeography), and the Geography capstone course (GEA4275 Human-Environmental Interactions in South Florida). This key upper division course in each program will serve as a pilot for implementing best practices for student-centered undergraduate research activities in the rest of the curriculum. In other words, if it works in the pilot class, then we plan to adopt similar activities in the remaining upper division courses in each program. The other exciting aspect is that the capstone course in Geography also serves as an elective for several programs outside of the college, for example, the Dorothy F. Schmidt College of Arts and Letters and the Harriet L. Wilkes Honors College. For goal 2, we plan to create two introductory research courses. The first will be a cross-disciplinary course at the exposure level to provide student-centered active learning approaches for teaching best practices for undergraduate research (EGN/GEO3910). The second will be a cross-disciplinary intensive level mentored research course designed to develop a conference level paper (EGN/GEO4911). The companion courses (each at the 1-credit level) in the College of Engineering and Computer Science have already been approved by the FAU Faculty Senate and cleared for offering in the Fall 2013 semester as a required course in the Civil Engineering program. The counterpart courses in the Geoscience Department will be created as part of this proposal. We envision these courses to be

team-taught to better meet the needs of students and faculty resources. We envision the culture of research to expand by providing research-focused enrichments to existing upper division coursework at the skill building level through the use of cross-disciplinary student-centered active learning activities and rubrics for faculty and students to make them easier to implement across the curriculum. Using our continuous improvement framework, we plan to train faculty, student mentors, and students to better incorporate student-centered undergraduate research components into their classes and embed these research-rich activities throughout the curriculum in line with program objectives. These much needed enhancements will create the environment to improve upper division learning outcomes, grow the culture of research across a diverse range of programs at FAU, increase graduate enrollment from the ranks of these now better prepared home-grown undergraduate researchers, and give our students the skills they need to succeed after graduation.

List of Courses scheduled for Enrichment:

Intro to Research 1 (EGN3910)

a) Proposed Undergraduate Research Level: Exposure
b) Listed Student Learning Outcomes Targeted : Knowledge, Formulate Questions, Plan of Action, Critical Thinking, Ethical Conduct, and Communication

Reinforced Concrete Design (CES 4702) and Photogrammetry (SUS3331)

a) Proposed Undergraduate Research Level: Skill building
b) Listed Student Learning Outcomes Targeted: Formulate Questions, Plan of Action, Critical Thinking, Ethical Conduct, and Communication

Intro to Research 2 (EGN 4911)

a) Proposed Undergraduate Research Level: Intensive
b) Listed Student Learning Outcomes Targeted: Knowledge, Formulate Questions, Plan of Action, Critical Thinking, Ethical Conduct, and Communication

Human-Environmental Interactions (GLY4822) / Biogeography (GEO4300) / Hydrogeology (GEA4275)

a) Proposed Undergraduate Research Level: Skill building
b) Listed Student Learning Outcomes Targeted: Knowledge, Formulate Questions, Plan of Action, Critical Thinking, Ethical Conduct, and Communication